

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 20

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte SHINTARO YAMAMICHI, HIROHITO WATANABE
and YOICHI MIYASAKA

Appeal No. 1997-4024
Application No. 08/299,407

ON BRIEF

Before KIMLIN, JOHN D. SMITH and WARREN, Administrative Patent Judges.

KIMLIN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 1-8, all the claims in the present application. Claim 1 is illustrative:

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1. A method of manufacturing a thin film capacitor comprising the steps of:

depositing an interlayer insulating film on a semiconductor substrate;

forming one or more contact holes at a desired position of said interlayer insulating film;

depositing a polysilicon layer to embed said contact hole(s);

flattening a surface of said polysilicon layer by chemical and mechanical polishing using at least one of piperazine and colloidal silica slurry; and

depositing on the flattened polysilicon layer a barrier metal film, a dielectric thin film having a high dielectric constant and an electrically conductive film for an upper electrode and then processing those films to have a desired size.

The examiner relies upon the following reference as evidence of obviousness

Yamamichi et al. (Yamamichi)	5,332,684	July 26, 1994
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Appellants' claimed invention is directed to a method of making a thin film capacitor wherein a polysilicon layer is embedded in the contact holes of an interlayer insulating film. The polysilicon layer is flattened by chemical and mechanical polishing using one of piperazine and a colloidal silica slurry. According to appellants, the conventional way for flattening a polysilicon layer is to use a dry etching

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process, but such an etching process makes it difficult to remove the polysilicon layer evenly across its surface "because the area within the contact holes can easily become overetched due to the microloading effect" (page 3 of principal brief). According to appellants:

The present invention solves the problem of overetching and resulting convex and concave portions of the interlayer insulating film by employing not a dry etching process, but rather a chemical and mechanical polishing process using piperazine or colloidal silica slurry to flatten the polysilicon layer 3 or secondary interlayer insulating film 7 [page 4 of principal brief].

Appealed claims 1-8 stand rejected under 35 U.S.C. § 103 as being unpatentable over Yamamichi.

Upon careful consideration of the opposing arguments presented on appeal, we concur with appellants that the examiner has failed to establish a prima facie case of obviousness for the claimed subject matter. Accordingly, we will not sustain the examiner's rejection.

The examiner concedes that Yamamichi "fails to teach flattening the surface of the polysilicon layer by chemical or mechanical polishing by piperazine or colloidal silica slurry" (page 4 of Answer). Hence, the single reference applied by the examiner fails to teach or suggest the essence of

appellants' claimed invention. Although the examiner states that "it is well known in the art that silicon can be polished by piperazine and colloidal silica" (page 5 of Answer), the examiner has not supplied any prior art reference to support the finding in the face of appellants' challenge to do so. In any event, even assuming that it was known in the art to use piperazine and colloidal silica to polish silicon, the examiner has not established on this record that it would have been obvious to replace the prior art technique of dry etching with such a polishing step to flatten a polysilicon layer in the specifically claimed method of making a thin film capacitor or semiconductor. In our view, the known use of piperazine and colloidal silica slurry to polish polysilicon, without more, is insufficient to establish the obviousness of the claimed method of manufacturing a thin-film capacitor and semiconductor.

In conclusion, based on the foregoing, the examiner's decision rejecting the appealed claims is reversed.

REVERSED

EDWARD C. KIMLIN)
Administrative Patent Judge)

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JOHN D. SMITH)	BOARD OF PATENT
Administrative Patent Judge)	APPEALS AND
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CHARLES F. WARREN)	
Administrative Patent Judge)	

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